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THE EFFECTS OF MULTIPLE-EXEMPLAR SELF-INSTRUCTIONAL TRAINING ON HIGH SCHOOL STUDENTS' GENERALIZED CONVERSATIONAL INTERACTIONS

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A multiple-baseline-across-students design was used to investigate the effects of multiple-exemplar self-instructional training on the acquisition and generalization of conversational interaction of 4 high school students with mental retardation. The multiple-exemplar component of the model consisted of (a) several peers without disabilities teaching the use of a self-instructional social skills strategy across diverse examples of conversational interactions and across two settings and (b) assessing the generalized effects of training across additional peers and one setting. Findings indicated that peers were effective in teaching the multiple-exemplar strategy and that peer training was associated with systematic increases in generalized conversational interactions with familiar and unfamiliar peers with and without disabilities in an additional setting. Social validation data indicated that following multiple-exemplar training, all participants' performances approximated those of general education students and was judged by others to have improved.

DESCRIPTORS: multiple-exemplar training, self-instruction, generalization, social skills, mentally retarded adolescents

The recent interest in community outcomes for secondary special education students has placed an increased emphasis on teaching skills that promote social interaction. Initiating and responding to conversation have been identified as socially valued skills that contribute to acceptance and participation in everyday life (Chadsey-Rusch, 1992; Haring & Breen, 1989; Sherman, Sheldon, Harchik, Edwards, & Quinn, 1992). Further, in concert with contextual variables such as opportunity and social support, these skills may promote friendship and social relationships among students with and without disabilities (Haring & Breen, 1992; Koegel, Koegel, Hurley, & Frea, 1992).

Previous studies have been successful at increasing conversational skills across diverse settings, ages, and disability groups (cf. Chadsey-Rusch, Karlan, Riva, & Rusch, 1984; Goldstein, Kaczmarek, Pennington, & Shafer, 1992; Haring, Roger, Lee, Breen, & Gaylord-Ross, 1986; Stewart, Van Houten, & Van Houten, 1992). However, interventions typically have required assistance by an external change agent (Chadsey-Rusch et al., 1984) or peer (Goldstein et al., 1992) to prompt acquisition and generalization of target behaviors or the use of a "prosthetic" such as a conversation booklet (Hunt, Alwell, & Goetz, 1988), videogame (Gaylord-Ross, Haring, Breen, & Pitts-Conway, 1984), verbal script (Breen, Haring, Pitts-Conway, & Gaylord-Ross, 1985), a context-specific task such as getting a cup of coffee (Breen et al., 1985), or leisure activity (Storey & Gaylord-Ross, 1987) to prompt conversation. When assessed, limited generalization of conversational skills to other persons and settings has typically been reported (Chandler, Lubeck, & Fowler, 1992; Koegel et al., 1992) or generalization has been restricted to a limited number of familiar social partners (Goldstein et al., 1992; Haring et al., 1986).

An important extension of existing intervention recommendations would be the identifi-

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cation of a procedure that promotes generalization of acquired skills to untrained situations and conversational partners. Teaching multiple examples of desired responses is a strategy that may be used to promote generalization outside an instructional setting (Chadsey-Rusch, Drasgow, Reinoehl, Halle, & Collet-Klingenberg, 1993; Horner, Sprague, & Wilcox, 1982; Stokes & Baer, 1977). For example, Chadsey-Rusch et al. (1993) taught 3 high school students with severe mental retardation to request assistance in several situations requiring help (e.g., unpackaging food items, opening doors, operating water fountains). Generalized requesting across additional situations and helpers was reported for 2 of the 3 students.

Multiple-exemplar training combined with a self-instructional component (Meichenbaum & Goodman, 1971) has been found to be effective in teaching generalized problem solving (Hughes, 1992; Hughes & Rusch, 1989) and generalized task sequencing (Hughes & Hugo, in press). The self-instructional training component in these investigations consisted of self-delivered verbal instructions and consequences. To date, however, the combined multiple-exemplar self-instructional strategy has not been utilized to promote generalized conversational interactions. Furthermore, peers without disabilities have rarely been used to teach conversational skills, despite the current emphasis on increasing peer interactions between people with and without disabilities (Haring & Breen, 1992; Odom & McConnell, 1992).

The current study was an exploratory application of multiple-exemplar self-instructional training to increase conversational interactions. Specifically, we evaluated the effects of the combined multiple-exemplar strategy used by Hughes and Rusch (1989) on (a) the acquisition of conversational skills by individuals with mental retardation and (b) the generalization of these skills without the need for external assistance, additional contingencies, or prosthetic aids. The multiple-exemplar component of the model consisted of (a) several peers without disabilities teaching the use of a self-instructional social skills strategy with diverse examples of conversational initiations in two settings and (b) assessing the generalized effects of training with additional peers (both familiar and unfamiliar and with and without disabilities) and one setting. Peer responses to participants' initiations were monitored, as were increases in eye gaze by both partners.

METHOD

Participants

Four young women enrolled in a secondary transition program in a large comprehensive high school participated in this study. All were members of a special education classroom that used community-based instruction to serve 15 students with moderate mental retardation. The students were selected for participation in the study because they were identified by their transition teacher and by direct observation as engaging in social interaction less often than their classmates while in school and in the community. Specifically, all 4 students were observed to initiate and respond to conversation with peers at low or nonexistent rates and to maintain little eye contact. One participant, Tanya, a graduating senior, recently had been refused a job at a restaurant because of reticence and lack of eye contact during her job interview. Detailed participant characteristics may be found in Table 1.

Peer Teachers

Ten students from general education classrooms volunteered to serve as peer teachers (to teach conversational skills to participants). Students ranged in grade level from freshmen to seniors, were both male and female, represented African-, Asian-, and Euro-American ethnic groups, and were chosen based solely upon availability and interest. Volunteers were recruited from classrooms, lunchrooms, and hallways in the school by the experimenters, who informally approached groups of students and announced the need for peer teachers for stu-

Table 1
Participant Characteristics

Participant (ethnicity)	Age	Diagnosis and IQ assessment	Adaptive behavior assessment[a]	Speech/language assessment	Medical and behavioral history	Medication
Patti (Euro-American)	20	Moderate MR, multiply handicapped 57[b]	Communicaton = 27 Daily living skills = 26 Socialization = 20	79, MA = 6 years[c] Unintelligible[d] 81, MA = 5 years[e]	Pes cavus syndrome, extremely small stature, speech and hearing impairments, cerebral palsy, fine and gross motor spasticity, neuromuscular disorder, use of hearing aids, physical therapy and audiologist services, immune system dysfunction, limited social interaction	None
Carrie Ann (African-American)	17	Moderate MR 44[f] 48[g]	Communication = 49 Daily living skills = 62 Socialization = 54	Not reported	Heart disease, obesity, fatigue, falling asleep frequently and sleeping excessively, involuntary tongue protrusions, limited social interaction	Penicillin
Tanya (Euro-American)	21	Moderate MR, Down syndrome 40[f]	Communication = 23 Daily living skills = 39 Socialization = 49	Articulation poor[d]	Heart murmur, speech disorder, receiving speech therapy, limited social interaction	None
Melissa (Euro-American)	19	Moderate MR, autistic, echolalic, severe expressive language delay 44[f]	Communication = 47 Daily living skills = 54 Socialization = 51	<40, MA = 5 years[c]	Talking to self, hitting and biting self, tantrums, extreme lack of social interaction	None

[a] Vineland Adaptive Behavior Scales.
[b] Wechler Adult Intelligence Scale—Revised.
[c] Peabody Picture Vocabulary Test—Revised.
[d] Denver Articulation Screening Examination.
[e] Test for Auditory Comprehension of Language.
[f] Wechler Intelligence Scale for Children—Revised.
[g] Stanford-Binet Intelligence Test.

dents with disabilities. Peer teachers were rotated randomly across participants, with the number of peers per participant ranging from 4 to 6.

Conversational Partners

Nineteen students with disabilities and 38 general education students agreed to serve as conversational partners (to converse with participants during generalization sessions). Students with disabilities were either classmates of the participants or students from other special education classes. Partners without disabilities were recruited from gym classes, classrooms, hallways, and lunchrooms by the experimenters' verbal requests for volunteers to talk with a student from a special education class. Partners

were both male and female, familiar and unfamiliar to the participants, represented a range of grade levels and ethnic groups, and were rotated randomly across participants with no attempt to match students according to ethnicity, grade, or gender. As with peer teachers, selection criteria included only availability and interest. The total number of conversational partners ranged from 23 to 32 per participant (8 to 15 partners with disabilities and 14 to 18 partners without disabilities). Because we wished to assess generalization, students who served as peer teachers never served as conversational partners.

Settings

The experimenters surveyed the high school environment to determine settings that the participants frequented and where social interaction was likely to occur. Three settings were identified: (a) one of two large lunchrooms that served the 3,000 students who attended the high school; (b) an area of the participants' classroom that contained two large round tables with chairs, magazine racks, and a small kitchen and that was used for preparing and eating snacks and taking breaks; and (c) a multipurpose room adjacent to the classroom that was used as a workroom for teachers and where students worked in small groups to complete piecework that had been contracted to the class, such as folding pizza boxes. A fourth setting (the gym) was added during follow-up sessions that were conducted during the next school year for the 2 participants (Patti and Melissa) who remained at the high school. Both general and special education students ate in the lunchroom at the same time; however, they were rarely observed to interact. Similarly, general education students were rarely seen in the participants' classroom or workroom, and general and special education students typically used the gym at separate times. These settings were chosen, however, because social interaction among students with disabilities occurred in them and because they had the potential for supporting social interaction with general education students.

Outcome Measures

Twelve outcome measures were assessed (see Table 2). During multiple-exemplar self-instructional training, we measured (a) frequency with which a participant initiated conversation and her partner responded, (b) frequency of participant's eye gaze toward partner, and (c) frequency of self-instruction steps verbalized by a participant. Generalization measures included (a) rate with which a participant initiated conversation, (b) percentage of intervals in which a participant initiated conversation or her partner responded, (c) percentage of intervals in which a participant or her partner engaged in eye gaze, and (d) frequency of self-instruction steps verbalized by a participant. Two additional measures were taken during generalization as a means of experimental control, including percentage of intervals in which a partner initiated conversation or a participant responded.

Initiating was defined as a participant or partner producing a verbal behavior directed toward a conversational partner that introduced a new topic or expansion of an existing topic, introduced new information that was not related to information from a prior utterance, or was preceded by at least 15 s with no interactive verbal behavior with the partner (Fey, 1986; Foster & Cone, 1986). Initiating, therefore, included occurrences of both conversational initiations and topic expansions. *Responding* referred to a participant or partner producing verbal behavior in response to a partner's initiation (without expanding on a topic or adding new information to a prior utterance) or asking for clarification (Breen, Kennedy, & Haring, 1991; Fey, 1986). All initiations and responses were scored without regard to their degree of appropriateness. (Inappropriate verbalizations rarely occurred possibly because, during self-instructional training, participants were taught by their peer teachers to verbalize an array of socially validated conversational initiations.) *Eye gaze* was

Table 2
Outcome Measures and Overall Interobserver Agreement Estimates and Kappa Values for Each Participant

Measure	Overall mean (%)				Range (%)				Kappa			
	P	C	T	M	P	C	T	M	P	C	T	M
Training[a]												
Frequency of participant initiating	100	100	100	100	100	100	100	100				
Frequency of partner responding	98	99	100	100	80–100	90–100	100	100				
Frequency of participant eye gaze	96	99	98	100	80–100	90–100	80–100	100				
Frequency of self-instruction steps verbalized	100	100	100	100	100	100	100	100				
Generalization												
Rate of participant initiating[b]	91	91	94	93	71–100	82–100	82–100	75–100				
Percentage of intervals participant initiating	88	92	91	95	60–100	80–100	60–100	80–100	.71	.84	.79	.84
Percentage of intervals partner responding	84	90	89	89	71–100	70–100	60–100	70–100	.66	.79	.77	.82
Percentage of intervals eye gaze by participant	94	91	95	98	70–100	70–100	70–100	75–100	.83	.85	.88	.95
Percentage of intervals eye gaze by partner	93	92	97	96	60–100	60–100	80–100	67–100	.81	.85	.90	.92
Frequency of self-instruction steps verbalized	100	100	100	100	100	100	100	100	1.0	1.0	1.0	1.0
Generalization (control measures)												
Percentage of intervals partner initiating	89	93	91	94	60–100	70–100	60–100	90–100	.59	.74	.59	.76[c]
Percentage of intervals participant responding	91	93	95	92	60–100	60–100	80–100	80–100	.48	.59	.75	.75[c]

Note. P = Patti, C = Carrie Ann, T = Tanya, and M = Melissa.
[a] Kappa values could not be calculated for training measures because there were no nonoccurrences of behavior.
[b] Kappa values could not be calculated for rate because overall mean was determined as a frequency ratio.
[c] Lower kappa values reflect low occurrences of behavior for control measures.

recorded if a participant's or partner's face was directed toward a partner's facial region for at least 5 continuous seconds, whether or not the partner returned the gaze (Prutting & Kirchner, 1983). As adapted from Meichenbaum and Goodman (1971), *self-instruction* consisted of four statements: (a) stating the problem ("I want to talk"), (b) stating the response ("I need to look and talk"), (c) evaluating the response ("I did it, I talked"), and (d) self-reinforcement ("I did a good job").

Experimental Design and Conditions

A multiple-baseline-across-students design was used to evaluate the effects of peer teaching of the multiple-exemplar self-instructional social skills strategy (an independent variable) on participants' initiating, eye gaze, and self-instruction during training (dependent variables). (Training data are available on request.) The same design was also used to evaluate the effects of participants' self-instruction during generalization (an independent variable) on their initiations and eye gaze when conversing with partners (dependent variables). (See generalization data.) A multiple-probe design (Horner & Baer, 1978) was used to collect intermittent data during the baseline and maintenance conditions of the generalization sessions. There were three experimental conditions: (a) baseline,

(b) multiple-exemplar self-instructional training, and (c) maintenance. Generalization sessions were conducted daily across all three conditions. Training was conducted only during the multiple-exemplar condition prior to generalization sessions.

Generalization sessions. During generalization sessions, which occurred continuously throughout the study, a participant was asked if she would like to talk with [partner's name]. When the participant agreed to talk (no participant refused), the two were asked to sit facing each other. If a participant and peer were unfamiliar with each other, they were introduced and the observation session began. These steps were taken during each session in order to promote the naturalness of the conversational situation and to allow the conversational partners, who frequently were unfamiliar with each other, to feel comfortable. No other information, instruction, or feedback was provided. Partners (peers with and without disabilities) and settings (lunchroom, classroom, workroom) were counterbalanced across all conditions.

Each generalization session provided only one opportunity for a participant to verbalize each of the four self-instruction steps. Steps 1 and 2 (self-delivered instructions) were verbalized before beginning conversation with a partner, and Steps 3 and 4 (self-delivered consequences) were verbalized after the conversation was terminated. As a means of experimental control, a probe technique (Hughes, 1992; Hughes & Rusch, 1989) was implemented whenever participants initiated conversation but did not self-instruct overtly (although they typically did). Specifically, an observer not associated with training asked a participant "What are you doing?" or "What do we say?" after she initiated conversation with a partner but did not overtly self-instruct.

Multiple-exemplar self-instructional training. Following baseline, multiple-exemplar self-instructional training began for Patti, with training for the other 3 participants following on a time-lagged basis. Order of introducing training to participants was arbitrary, because occurrences of initiations were low or nonexistent across participants regardless of setting or partner characteristics (i.e., peer with or without disabilities). Order of training and generalization sessions was randomized daily across participants. Peer teachers (4 for Patti and Melissa, 5 for Carrie Ann, and 6 for Tanya, respectively) and settings (two per participant) were varied for each participant across training sessions as a multiple-exemplar component of the training package. Exact number of peer teachers per participant was based upon availability, although a minimum of 4 was considered to provide sufficient exemplars, based upon the generalization literature (Pancsofar & Bates, 1985; Stokes & Baer, 1977). Multiple examples of conversational initiations derived from a pooled list of conversational openers were taught to participants. Participants were trained only in settings designated for training; no training was conducted in generalization settings (lunchroom and gym for Patti and Melissa, workroom for Carrie Ann, classroom for Tanya). Locations within settings were varied to increase the variety of environmental stimuli as an additional multiple exemplar.

Self-instructional social skills training procedures (Meichenbaum & Goodman, 1971) were adapted from Hughes (1992) and Hughes and Rusch (1989) and were developed into a training script to guide peer teachers (available upon request). As a measure of fidelity of treatment, peer teachers were observed to follow the script during all sessions. Before each training session, participants were asked by an observer if they would like to talk to their peer teacher and always consented to do so. Next, the peer teacher presented a rationale for training and asked the participant if she would like to learn how to talk to people more easily. The peer then verbalized the self-instructional statements stated in the script while modeling "correct talking," which was defined as looking at partner and asking five questions chosen from the list of conversational openers (Step 1). Then the par-

ticipant performed correct talking while the peer verbalized the self-instructions aloud (Step 2), after which the participant practiced correct talking again, verbalizing the self-instructions herself (Step 3). The participant was allowed to ask questions from the list of openers she had been taught or could select her own. Self-instructional statements were adapted from Meichenbaum and Goodman (1971): Step 1, identifying the problem (e.g., "I want to talk"); Step 2, stating the response (e.g., "I need to look and talk"); Step 3, self-evaluation (e.g., "I did it, I talked"); and Step 4, self-reinforcement (e.g., "I did a good job"). Steps 1 and 2 were verbalized before and Steps 3 and 4 were verbalized after performing correct talking. The entire training sequence was then repeated once, providing participants with two opportunities to verbalize all four self-instruction steps per session.

Participants were allowed to develop individual adaptations of the statements, although prompting and corrective feedback were provided if no verbalization occurred. Feedback consisted of stopping the trial, modeling the correct verbalization, and then allowing the participant to practice the correct response. Verbal praise was delivered on a variable basis following correct responding and verbalizing. Because 1 student (Patti) had a hearing impairment and because prior work (Hughes & Hugo, in press) indicated that acquisition of self-instruction by individuals with mental retardation was facilitated by manual communication, peer teachers both signed and verbalized self-instructions if a participant did not readily imitate self-instructions. Illustrations of several signs were provided for the peer teachers, none of whom knew how to sign. Although participants typically verbalized self-instructional statements, they also occasionally signed the self-instructions that had been taught. To promote generalization, at the close of each training session, peer teachers reminded participants to self-instruct when they wished to talk to someone.

To assess maintenance, multiple-exemplar self-instructional training was withdrawn completely on Sessions 28, 30, 38, and 40 for Carrie Ann, Patti, Tanya, and Melissa, respectively. Four criteria were established for terminating training. Two of these criteria were derived from the range of expected performance established by social comparison: (a) 90% occurrence unprompted conversational initiation and eye gaze for three consecutive training sessions and (b) an initiation rate of 2.5 per minute, 55% intervals engaged in initiating, and 75% intervals engaged in eye gaze for three consecutive generalization sessions. Participants were also required to verbalize (or sign) all four self-instruction statements for three consecutive training and generalization sessions. Finally, participants responded affirmatively when asked if they chose to terminate training and to try "talking on their own."

Observation and Recording Procedures

A participant and her partner were observed once daily for 5 min at a randomly chosen time between 11:00 a.m. and 12:30 p.m. across all generalization sessions. However, if a participant did not initiate conversation during 3 continuous minutes, the session was terminated.

Participants and peer teachers also were observed individually during training that took place daily during the multiple-exemplar self-instructional training condition, before generalization sessions. Average length of training sessions was 15 min (range, 8 to 31 min). Between 15 min and 1.5 hr always elapsed between the end of training and the beginning of a generalization session, during which time the participant returned to her ongoing activity (e.g., eating lunch).

Event recording was used for all training measures and the two generalization measures (participant initiations and self-instruction steps verbalized). Participant initiations were converted from frequency to rate to allow for social comparison. All other generalization measures were monitored using a 10-s observe, 5-s record partial-interval recording system, as used by

Storey, Rhodes, Sandow, Loewinger, and Petherbridge (1991) to measure social interaction. (See Table 2 for a list of all recorded measures.) More than one behavior could occur and be scored per interval.

To control for partner initiations during generalization sessions, partners were instructed prior to each session to initiate no more than three verbalizations of 10 to 20 words, to respond to participant's initiations with only one statement per response, and to direct verbalizations to the participant only. This measure was implemented to ensure the opportunity for participants to initiate conversation and to minimize partners' initiations as a prompt for participants' initiations. Data supported the fidelity of the implementation of the measure across all generalization sessions (data are available upon request).

Interobserver Agreement

The first author served as primary observer; three university students were employed as additional observers. Observers did not provide training to any participants. Prior to data collection, all observers read and discussed the definitions of all outcome measures and the description of the observation procedures. The observers then practiced the observation and recording procedures in the actual settings and by watching videotapes of student dyads conversing. Observers were required to reach a criterion of 80% interobserver agreement for all outcome measures for two consecutive practice sessions before collecting data.

Interobserver agreement on all 12 measures was assessed at least four times per condition during generalization sessions (i.e., baseline, multiple-exemplar self-instructional training, and maintenance) and at least six times during training for each participant. Interobserver agreement (as calculated per session per participant) was assessed across 70% of all training sessions (n = 28) and 49% of all generalization sessions (n = 91). The point-by-point agreement method (Kazdin, 1982) was used to assess percentage agreement for all measures except frequency of participant initiation (prior to converting to rate), which was calculated as a frequency ratio (Kazdin, 1982). Kappa (Cohen, 1960) was calculated for each participant to represent an agreement measure for occurrence and nonoccurrence of target behaviors, corrected for chance agreement among observers. Overall interobserver agreement estimates and kappa values for outcome measures are found in Table 2. Note that kappa values, which ranged from .66 to 1.0 for generalization measures, are high, considering that this estimate accounts for chance agreement. Lower values for control measures reflect low occurrences of behavior.

Social Validation Measures

Social validation measures (Kazdin, 1977; Wolf, 1978) were used to assess the importance and acceptability of target behaviors within the school environment. Subjective evaluation (Kazdin, 1977) of the perceived importance of target behaviors (i.e., initiations, responses, eye gaze) was performed as follows. During informal interviews, the 4 participants indicated that they felt uncomfortable when they met new people, did not know what to say, and wanted to learn to talk to others without being afraid. Informal interviews with general education students revealed that when they met someone new, they felt it was important that the person approach them, smile, ask questions, and make eye contact. Written questionnaires completed by five general and four special education teachers, six general and five special education students, and four lunchroom and cleaning staff (a total of 23 responses) agreed that social behaviors they considered "important for a person to show when he or she first meets you" included "makes eye contact" (23 of 23 responses); "speaks audibly" (23 of 23); "smiles, looks friendly and interested" (20 of 23); and "asks questions" (16 of 23); whereas less highly rated behaviors included "tells about self" (10 of 23)

Table 3
Levels of Expected Performance

Target behavior	*M*	Range	*SD*	Minimum expected performance[a]
Rate of initiating[b]	2.8	1.4–4.0	0.74	2.0–3.5
Percentage time initiating	55.6	13–100	24.8	30–80
Percentage occurrence eye gaze	73	25–100	22.5	50–96

[a] Calculated as 1 standard deviation below the mean.
[b] Calculated as frequency per minute.

and "sits or stands straight without being 'laid back'" (7 of 23).

Social comparison (Kazdin, 1977) was used to establish a range of acceptable performance as determined by observation of general education students' conversations. Specifically, 15 pairs of randomly selected general education students representing both sexes, various ethnic groups, and all grade levels were observed for 5-min sessions over a 3-week period in the school lunchroom while they were eating in their naturally occurring social groups. Observers informally approached groups of students and asked "Is it okay if we watch while you eat?" and then observed student dyads that occurred within existing groups using the same observation and recording procedures employed during generalization sessions. Based upon a convention commonly used in the identification of language disorders, we established a range of expected performance as one standard deviation above and below mean performance for general education students (Aram, Morris, & Hall, 1993; Lahey, 1990; Prutting & Kirchner, 1987) (see Table 3).

Using procedures adapted from Haring et al. (1986), general education students representing diverse ethnic and age groups and both genders were chosen at random from the lunchroom and classrooms to identify statements or questions they typically used to start or continue a conversation with a friend. The purpose of this procedure was to generate a pool of conversational initiations that are considered to be appropriate among students within the school environment. Each student was given a questionnaire with the written instruction, "List some 'openers' you would say to a friend when you first sit down to lunch." Thirty-eight students completed questionnaires, resulting in a pool of 114 examples of initiations, primarily in the form of questions. Fifty of these initiations (questions) were then chosen as multiple exemplars of conversational initiations to be taught by peer teachers during multiple-exemplar training.

RESULTS

Generalization Sessions

Initiation rate. Figure 1 displays participants' rate of initiating conversation with novel partners (i.e., familiar and unfamiliar students with and without disabilities who did not serve as peer teachers) and in one or two additional settings throughout generalization sessions. During baseline, few initiations to partners either with or without disabilities were observed for all participants; only one session fell within the range of expected performance (Session 14 for Carrie Ann). Introduction of multiple-exemplar self-instructional training resulted in rapid increases in initiation rate to partners both with and without disabilities for all participants in both trained and untrained settings. Specifically, initiating conversation reached and maintained minimum (although not criterion) expected rate as established by social comparison (2.0 initiations per minute) following two training sessions for Patti and Carrie Ann and nine sessions

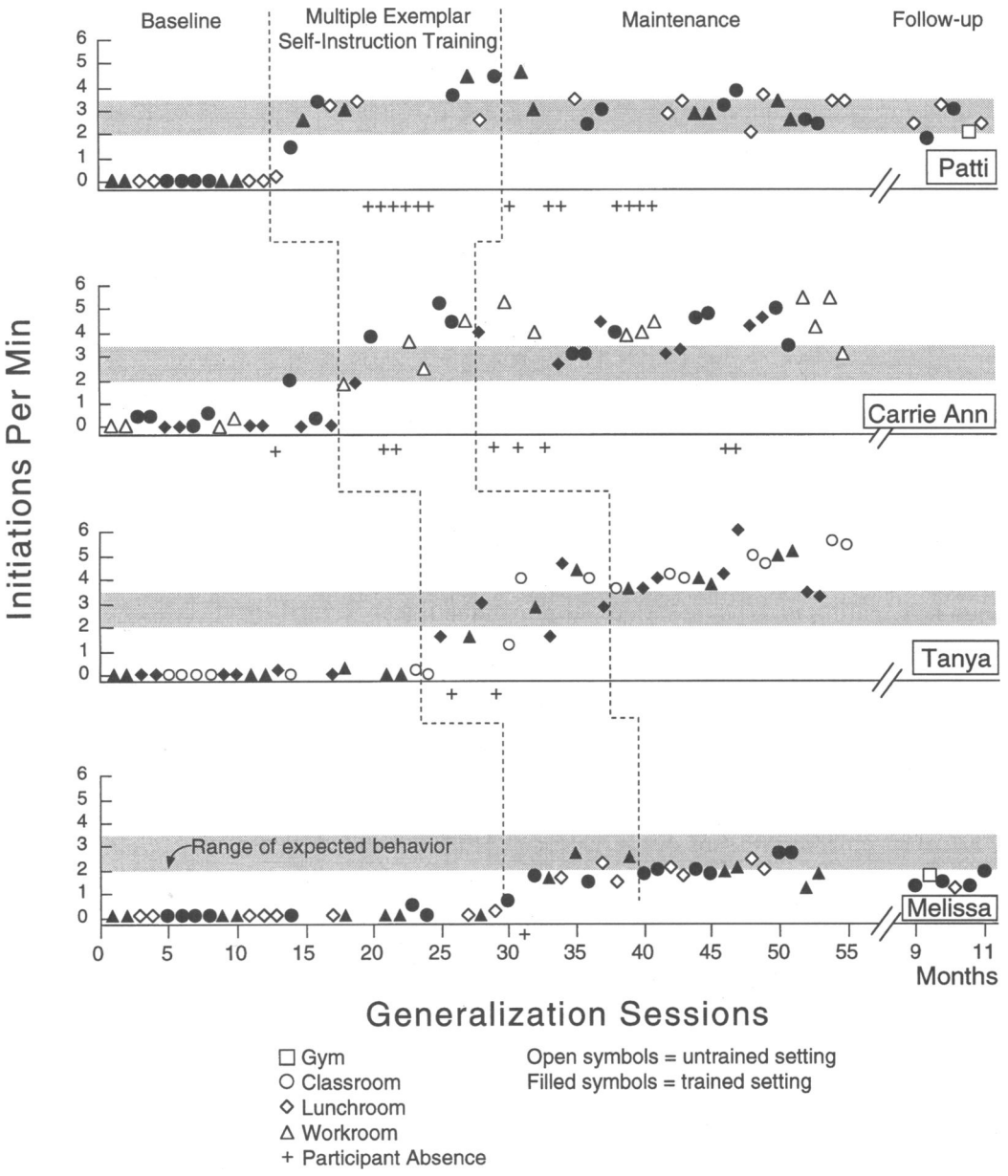

Figure 1. Conversational initiations per minute by all participants to partners with and without disabilities during generalization sessions. Banded area indicates range of expected performance based upon social comparison data.

for Tanya. Melissa's initiations reached minimum rate following four training sessions and maintained that rate for 11 of 19 sessions through the end of the withdrawal condition. Her slower rate may have been due to the ritualistic-like behaviors she typically engaged in between initiations (e.g., twisting her hair, squinting her eyes, pushing her finger into her cheek) and her slow rate of speech. The average number of conversational partners throughout generalization sessions was 27 (range, 23 to 32) with a mean of 11 students with disabilities (range, 8 to 15) and 16 without disabilities (range, 14 to 18). *t* tests of significance revealed

no significant difference ($p < .05$) in rates of initiating conversation to partners with or without disabilities or familiar or unfamiliar partners for any participant.

Percentage of intervals in which participants initiated conversation or partners responded. Percentage of intervals in which participants initiated conversation or partners responded followed a similar pattern of improvement (see Figures 2 and 3). During baseline, mean percentage of intervals in which participants engaged in initiating per session was 0% for Patti, 7% for Carrie Ann, and 2% for Tanya and Melissa. Performance increased to within the range of expected behavior (30% to 80%) during the multiple-exemplar training condition (M = 75% for Patti, 69% for Carrie Ann, 59% for Tanya, and 56% for Melissa). Performance was maintained at similar or higher levels during maintenance (M = 79%, 76%, 91%, and 56% for Patti, Carrie Ann, Tanya, and Melissa, respectively). Partners' percentage of intervals engaged in responding increased systematically as participants' initiations increased, indicating that conversational partners were engaged in taking turns. During baseline, mean responding across partners was 3% (range, 0% to 8%); this increased to 57% during the training condition (range, 47% to 63%) and was maintained at 63% during maintenance (range, 52% to 77%).

Eye gaze. Participants' engagement in eye gaze similarly increased to within the expected range (50% to 96% of the time) after training was introduced. Eye gaze averaged 9% of intervals during baseline (range, 3% to 16%), 85% during the training condition (range, 77% to 96%), and 97% during maintenance (range, 93% to 100%) for all participants. Partners increased their eye gaze systematically in correspondence with that of participants, from a mean of 19% during baseline (range, 8% to 38%) to 84% during the training condition (range, 75% to 90%) and 98% during maintenance (range, 95% to 99%).

Verbalization of self-instructions. No participant self-instructed during baseline. After training was introduced, Patti and Carrie Ann verbalized all four self-instructions during all generalization sessions conducted during training and maintenance conditions. Tanya also verbalized all four statements except during three generalization sessions (Sessions 25, 28, and 32) when she failed to self-reinforce (Step 4). Melissa verbalized only Step 1 (identifying the problem) during the first session of the training condition, no steps during the second session, and all but Step 2 (stating the response) during the third session. Thereafter, she verbalized all four steps throughout all generalization sessions. For all participants, frequency of self-instruction increased systematically with increases in percentage of intervals in which participants initiated conversation (data are available upon request).

Follow-up sessions. Follow-up probes for the 2 participants who remained at the high school during the next academic year (Patti and Melissa) were collected 9 to 11 months after the maintenance condition ended (Session 55) (see Figures 1, 2, and 3). No self-instructional training was provided, and observation was conducted using the same procedures as employed during generalization sessions. Patti maintained her rate of initiating within the range of expected behavior, and Melissa's rate was slightly below the range. Percentage of intervals in which participants initiated conversation and engaged in eye gaze was maintained within or above the expected range for both Patti and Melissa throughout follow-up. Conversational skills were also observed in the gym, a novel setting, during both participants' generalization probes.

Training Sessions

Participants rapidly acquired target behaviors during multiple-exemplar self-instructional training sessions (data are available upon request). Criteria for terminating training (i.e., minimum 90% occurrence unprompted conversational initiation and eye gaze during training; 100% self-instruction steps verbalized or

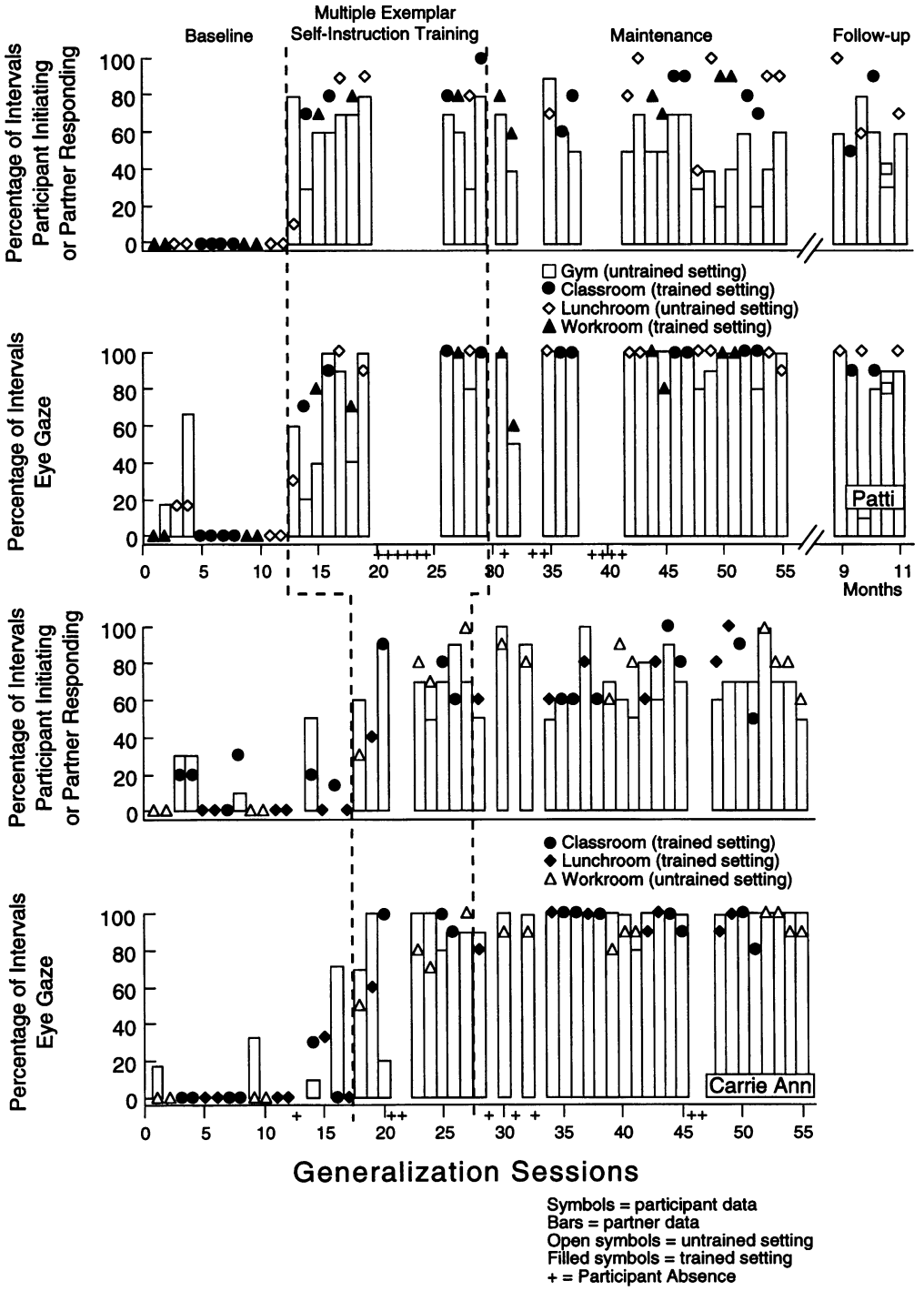

Figure 2. Percentage of intervals in which participant initiated conversation or partner responded and percentage of intervals of eye gaze for participant and partner during generalization sessions for Patti (upper two panels) and Carrie Ann (lower two panels).

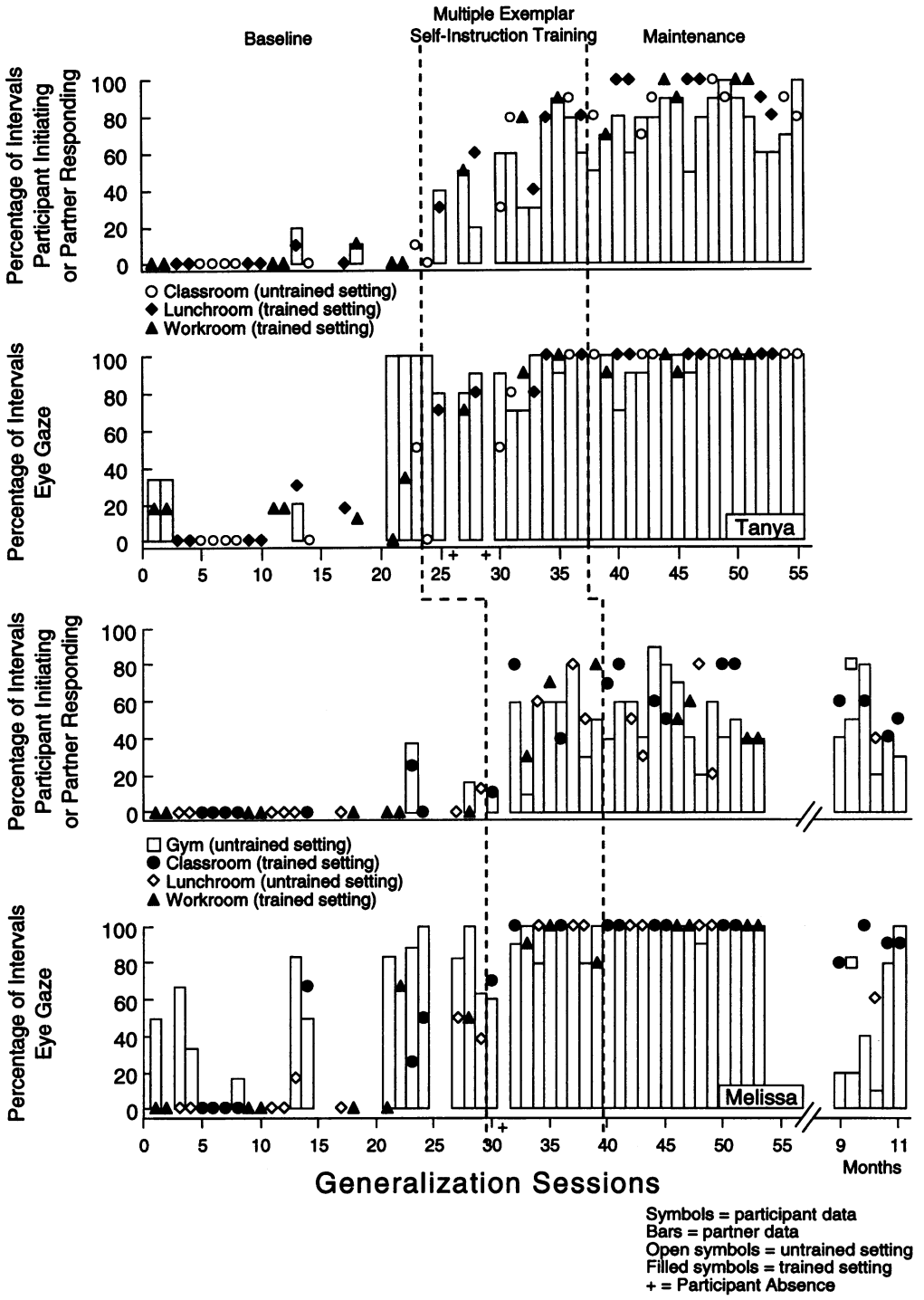

Figure 3. Percentage of intervals in which participant initiated conversation or partner responded and percentage of intervals of eye gaze for participant and partner during generalization sessions for Tanya (upper two panels) and Melissa (lower two panels).

signed during three consecutive training and generalization sessions; initiation rate of 2.5 per minute, 55% intervals engaged in initiating, and 75% intervals engaged in eye gaze during generalization) were reached after 11, 8, 12, and 9 training sessions for Patti, Carrie Ann, Tanya, and Melissa, respectively, at which point training was completely withdrawn and maintenance was assessed.

Social Validation

Social comparison outcome measures indicated that following the introduction of training, participants' performance approximated that of general education students (i.e., was maintained within the range of expected performance). Subjective evaluation measures of outcomes (i.e., questionnaires and interviews with participants, peers, teachers, and family members) collected after training indicated that changes in participants' performance were perceived to be socially important. Participants reported that they found it easier to talk to people now, they spoke up more often, and they liked participating in the project. Family members indicated that participants were becoming more assertive and confident and were initiating conversations and asking questions. Ratings (N = 12) completed by peers and teachers averaged 1.77 (on a scale of 1 to 5, where 1 = *strongly agree* and 5 = *strongly disagree*) in response to seven statements regarding improvement in participants' performance (e.g., "[Participant's name] makes more frequent eye contact, speaks up more, initiates more conversation").

DISCUSSION

This investigation demonstrated that multiple-exemplar self-instructional training provided by peers was effective in increasing conversational interaction of high school students with moderate mental retardation. Partners' responses to participants' initiations also increased systematically when participants increased their use of conversational skills, indicating that conversational turn taking between partners had increased. Social validation data indicated that, following multiple-exemplar training, all participants' performance approximated that of general education students and was judged by others to have improved.

These findings extend prior research in several ways. First, participants generalized their use of conversational initiations to 23 to 32 familiar and unfamiliar peers with and without disabilities and in an additional setting. This finding is important, because lack of generalized effects has been noted as a major limitation to the technology of teaching social interaction skills (Chadsey-Rusch, 1990; Chandler et al., 1992; Odom & McConnell, 1992; Stokes, 1992). In this study, the use of an observer who arranged interactions between a participant and her partner and asked if they would like to converse cannot be separated from the entire intervention package. However, after training, all participants were observed to engage in 5-min continuous conversational interactions without external assistance or contingencies. By contrast, Chadsey-Rusch et al. (1984) reported that adults with mental retardation in their study did not direct sustained questions to their conversational partners unless they were prompted continually to do so by an experimenter.

Second, participants were taught by several peers to converse across diverse settings. Instead of learning only one scripted conversation, participants were taught a pool of questions to ask their peers when initiating conversation. The multiple-exemplar training package (i.e., multiple peers, settings, conversational initiations) may have been responsible for the generalized effects of training with large numbers of partners (M = 27 per participant) and in an additional setting by varying the relevant stimuli likely to prompt self-instruction, which, in turn, prompted conversation (e.g., partner's face, table where sitting when facing partner, people talking at other tables) (Horner et al., 1982; Stokes & Baer, 1977). This procedure follows Stokes and Baer's recommendation to

introduce diverse exemplars of stimulus conditions into training in order to reflect the dimensions of desired generalization. In contrast, teaching with a single exemplar (e.g., one conversational partner in one setting) is likely to increase the probability that conversational responses will be emitted exclusively in the presence of the one discriminative stimulus established in training. For example, Storey and Gaylord-Ross (1987) concluded that lack of generalization among high school youths who were taught to make positive verbal statements while playing pool may have been because only one leisure activity was introduced in training. They suggested that training during a variety of activities may have promoted generalized positive verbal behavior.

Another factor contributing to the effectiveness of the intervention may have been the use of peers to teach targeted conversational skills. Although studies have investigated the effectiveness of young children as teachers of social behavior (e.g., Kohl, Moses, & Stettner-Eaton, 1984; Odom, Hoyson, Jamieson, & Strain, 1985), studies among high school youth primarily have examined the effects of peers as teachers of academic, community, or vocational skills rather than social skills (Haring, 1991; Haring, Breen, Pitts-Conway, Lee, & Gaylord-Ross, 1987) or have used teachers or experimenters to teach social skills (Chadsey-Rusch, 1990). Because our ultimate goal is to increase social interaction among students with and without disabilities, it seems reasonable to employ as models of social behavior those to whom we expect generalization to occur as a means of programming common stimuli (Stokes & Baer, 1977). This investigation demonstrated that peers were effective and reliable at teaching students with disabilities to increase their conversational initiations (training data available upon request). Furthermore, peers taught examples of conversational initiations that they themselves used when talking with their friends. When combined with multiple-exemplar self-instructional training, having peers teach examples of their own conversation may have related functionally to the generalized effects reported with other partners and settings.

A further contribution of this study is that a baseline of typical student performance was established through social comparison. Prutting and Kirchner (1987) argued that a notion of normal practice within a specific context is necessary in order to judge whether behavior conforms to or violates normative communicative interaction within that context. In this study, a standard range of expected social behavior was derived by observing pairs of general education students who were conversing in naturally occurring social groups in the lunchroom and who represented a range of ages and ethnic groups. Using a convention common to the field of language disorders, we established a range of expected behavior as one standard deviation above and below the mean of individuals within the same social context (Lahey, 1990).

With the introduction of training, all participants' initiations increased from almost nonexistent levels to approximate the range of expected social performance. Two issues are relevant to this finding. First, rates of initiating conversation sometimes exceeded one standard deviation above the mean (see data for Carrie Ann and Tanya). Prutting and Kirchner (1987) observed that there is considerable variability with which individuals adhere to communicative conventions. In judging the appropriateness of conversational behavior, the critical issue is whether a behavior falls too far from the normal curve to be appropriate to the context and in some way interferes with a social interaction. In this study, a higher frequency of conversational initiation did not interfere with social interaction. Figures 2 and 3 indicate that rates of initiating conversation that exceeded the mean did not impede turn taking, as evidenced by the correspondingly high percentage of intervals of partners' responses.

Second, because of their low baseline rates of conversational initiations, participants in this

study could be considered by language interventionists to be conversationally passive (Fey, 1986). Fey argued that persons who rarely initiate social interaction or expand on conversational topics (i.e., passive conversationalists) have limited opportunity to engage in the social interaction required to learn language. Fey recommended that appropriate instruction for these individuals include (a) increasing the frequency of conversational initiations in a variety of social settings and (b) expanding individuals' repertoires of conversational initiations in order to increase their social assertiveness skills. We used an intervention that encompassed both of these instructional procedures by providing massed practice in initiating conversation during training to partners who responded to each conversational initiation and by having several peers teach a variety of conversational initiations in two different settings. Training resulted in all participants increasing their near-zero baseline rates of initiating conversation to approximate normative rates. Becoming more active conversational partners may have allowed participants to increase their opportunities to learn accepted social behavior through repeated and naturalistic practice in initiating conversation and to contact the naturally occurring reinforcement available when their partners responded to their initiations.

Future research should address limitations of this study. Although participants acquired useful conversational skills, social involvement was limited to short conversation periods and a structured interaction format. Future applications of the intervention should address the development of typical social interaction patterns, social relationships, and friendships among students with and without disabilities. Multiple-exemplar training was effective in producing generalized conversation, a critical component of a social relationship or friendship. However, an observer was required to arrange and prompt interactions among participants and their partners. The addition of supportive measures, such as a social network or access to a videogame room, probably would be necessary to set the occasion for and sustain naturally occurring long-term interactions and friendships.

In summary, this investigation extends the research on social interaction by providing a data-based demonstration of the generalized effects of a peer-taught, multiple-exemplar conversational skills intervention. The study presents a beginning step toward teaching individuals with mental retardation to initiate conversation and to enter into social interaction with peers. Because of the failure of many social competence programs to produce generalized behavioral change, multiple-exemplar self-instructional training holds promise as a strategy that individuals may use for causing pervasive, durable change in their own social behavior. The ultimate utility of the model will be demonstrated by its future contribution to the increased participation and acceptance of people with disabilities into everyday life.

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